

1. A system for detection of oil comprising:

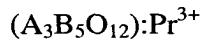
a scintillator material comprising a cubic garnet host and praseodymium distributed within the host, wherein the praseodymium acts as an activator, and wherein the scintillator emits ultraviolet radiation in response to stimulating gamma ray radiation; and

a scintillating radiation detector optically coupled to the scintillator capable of detecting the emitted ultraviolet radiation.

2. The system of claim 1, wherein the scintillator material has a primary decay time of less than about 20 nanoseconds.

3. The system of claim 1, wherein the stimulating gamma ray radiation is reflected by hydrogen bearing compounds indicating the presence of oil.

4. The system of claim 1, wherein the scintillator material has the formula



wherein A is one or more elements selected from the group consisting of Lu, Y, La and Gd and

wherein B is one or more elements selected from the group consisting of Al, Ga, Sc and In.

5. The system of claim 3, wherein the praseodymium is present in the range of about 0.01 mole percent to about 9 mole percent relative to element A.

6. The system of claim 1, wherein the detector is an avalanche photodiode.

7. The system of claim 5, wherein the avalanche photodiode is a SiC avalanche photodiode.
8. The system of claim 1 wherein the system is capable of operating at temperatures up to about 175°C.
9. The system of claim 1 further comprising a lens for focusing the emitted radiation on the radiation detector.
10. The system of claim 1 further comprising an amplifier.
11. The system of claim 1 wherein the scintillator material is a single crystal.
12. The system of claim 11 wherein the scintillator material is a single crystal having the formula  $(\text{Lu}_3\text{Al}_5\text{O}_{12})\text{:Pr}^{3+}$ .
13. A method for oil exploration comprising:  
optically coupling a radiation detector to a scintillator material comprising a cubic garnet host and praseodymium distributed within the host, wherein the praseodymium acts as an activator, and wherein the scintillator material emits ultraviolet radiation in response to stimulating gamma ray radiation;  
lowering the detector and the scintillator material below the surface of the earth;

detecting ultraviolet radiation emitted by the scintillator material in response to stimulating gamma ray radiation reflected by hydrogen emitting compounds indicating the presence of oil.

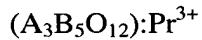
14. A method for detecting gamma ray radiation comprising:

optically coupling a radiation detector to a scintillator material comprising a cubic garnet host and praseodymium distributed within the host, wherein the praseodymium acts as an activator, and wherein the scintillator material emits ultraviolet radiation in response to stimulating gamma ray radiation;

exposing the scintillator material to gamma ray radiation;

detecting with the radiation detector ultraviolet radiation emitted by the scintillator material in response to stimulating gamma ray radiation.

15. The method of claim 14 wherein the scintillator material has the formula



wherein A is one or more elements selected from the group consisting of Lu, Y, La and Gd and

wherein B is one or more elements selected from the group consisting of Al, Ga, Sc and In.

16. The method of claim 15, wherein the praseodymium is present in the range of about 0.01 mole percent to about 9 mole percent relative to element A.

Attorney Docket Number: 61765.005013  
Client Docket Number: 121368

17. The method of claim 14 wherein the scintillator material is a single crystal.
18. The method of claims 17 wherein the scintillator material is a single crystal having the formula  $(\text{Lu}_3\text{Al}_5\text{O}_{12})\text{:Pr}^{3+}$ .
19. The method of claim 18 wherein the praseodymium is present in the range of about 0.01 mole percent to about 9 mole percent relative to Lu.